CLAIMS

1-38 (WITHDRAWN)

39. (CURRENTLY AMENDED) A computer-implemented method for building an artificial neural network from a set of different types of candidate activation functions, comprising the steps of:

retrieving an input data set that includes observations and at least one target for the observations;

reducing the input data set such that the reduced input data set contains a number of points less than the number of observations;

optimizing parameters of the candidate activation functions with respect to the reduced input data set through use of an objective function;

generating results for each of the candidate activation functions using the optimized parameters of the candidate activation functions and the reduced input data set;

selecting a first activation function from the candidate activation functions based upon the generated ~~simulated~~ results;

using the selected first activation function within a first layer of the artificial neural network,

wherein residuals result from predictions by the first layer's selected activation function of the target; and

selecting a second activation function from the candidate activation functions to form a second layer based upon the second activation function's capability to predict the residuals.

40. (CURRENTLY AMENDED) The method of claim 39 wherein a candidate activation function has a function type and one or more associated parameters;

wherein the first and second selected ~~candidate~~ activation functions differ ~~in~~ with respect to function type from each other; wherein the first and second selected activation functions further differ with respect to weights associated with their inputs and outputs.

41. (CURRENTLY AMENDED) The method of claim 40 wherein a first candidate activation function type is ~~used~~ selected as the first activation function for use within a first layer of the artificial neural network, wherein a second candidate activation function type is selected as the second activation function for use ~~used~~ within a second layer of the artificial neural network, wherein the selected first candidate activation function type is a different function type than the selected second candidate activation function type because of the function types respectively associated with the selected first and second candidate activation functions and not because of weights associated with the selected first and second candidate activation functions.

42. (ORIGINAL) The method of claim 40 further comprising the steps of:

determining principal components for the input data set;

selecting the principal components that are substantially correlated to the target; and

generating a frequency table that describes frequency relationships between values of the selected principal components and the inserted points.

43. (ORIGINAL) The method of claim 42 further comprising the step of:

determining which of the candidate activation functions to use within a layer of the artificial neural network by using the frequency relationships.

44. (ORIGINAL) The method of claim 42 further comprising the steps of:

determining parameters of the candidate activation functions by optimizing the candidate activation functions with respect to a predetermined objective function;

selecting which of the candidate activation functions to use within a layer of the artificial neural network; and

creating a layer of the artificial neural network with the selected candidate activation function and its respective optimized parameters.

45. (ORIGINAL) The method of claim 44 wherein the objective function is a sum of squares error objective function.

46. (ORIGINAL) The method of claim 44 wherein the objective function is an accuracy rate objective function.

47. (ORIGINAL) The method of claim 44 wherein a layer weight is determined during the optimizing of the candidate activation functions.

48. (ORIGINAL) The method of claim 44 wherein the frequency table specifies which observations of the selected principal components is accorded a greater weight during the optimizing of the candidate activation functions.

49. (ORIGINAL) The method of claim 44 further comprising the steps of:

generating prediction outcomes for each of the candidate activation functions; and

selecting one of the candidate activation functions to use within a layer of the artificial neural network based upon the generated prediction outcomes.

50. (ORIGINAL) The method of claim 49 wherein the optimized parameters of the candidate activation functions are used to generate the prediction outcomes.

51. (ORIGINAL) The method of claim 49 wherein the prediction outcomes are generated by testing each of the candidate activation functions with the principal components and the observations.

52. (ORIGINAL) The method of claim 49 wherein the observations are passed through a linking web into each of the candidate activation functions to evaluate fit of the prediction outcomes to an evaluation data set.

53. (ORIGINAL) The method of claim 52 wherein the input data set is used as the evaluation data set for determining a first stage of the artificial neural network.

54. (ORIGINAL) The method of claim 53 wherein residuals from the first stage are used as the evaluation data set for determining a second stage of the artificial neural network.

55. (ORIGINAL) The method of claim 54 wherein residuals from the second stage are used as the evaluation data set for determining a third stage of the artificial neural network.

56. (ORIGINAL) The method of claim 49 wherein the parameters of the candidate activation functions are generated substantially in parallel.

57. (ORIGINAL) The method of claim 49 wherein the prediction outcomes for the candidate activation functions are generated substantially in parallel.

58-69 (WITHDRAWN)

70. (NEW) The method of claim 39 wherein a candidate activation function has a function type and one or more associated parameters;

wherein nodes in the first layer have a different activation function type than nodes in the second layer because different activation functions were selected from the set of candidate activation functions.

71. (NEW) The method of claim 1 wherein the neural network is constructed in a layer-by-layer stepwise fashion such that the first layer of the neural network is completed before the second layer of the neural network is determined;

wherein type of activation function for the second layer is unknown until after the first layer has been completed.

72. (NEW) A computer-implemented system for building an artificial neural network from a set of different types of candidate activation functions, comprising:

first software instructions configured to retrieve an input data set that includes observations and at least one target for the observations;

wherein parameters of the candidate activation functions are optimized with respect to the input data set through use of an objective function;

second software instructions configured to generate results for each of the candidate activation functions using the optimized parameters of the candidate activation functions and the input data set;

third software instructions configured to select a first activation function from the candidate activation functions based upon the generated results;

wherein the selected first activation function is used within a first layer of the artificial neural network,

wherein residuals result from predictions by the first layer's selected activation function of the target; and

fourth software instructions configured to select a second activation function from the candidate activation functions to form a second layer based upon the second activation function's capability to predict the residuals.